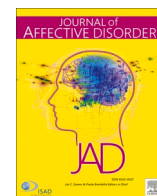




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Research paper

Self-compassion buffers the impact of learned helplessness on adverse mental health during COVID-19 lockdown

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ARTICLE INFO

Keywords:

Learned helplessness

Self-compassion

Mental health

COVID-19 lockdown

ABSTRACT

Background: Learned helplessness may be the underlying cause of poor mental health status among college students during the COVID-19 lockdown, and self-compassion as a positive psychological quality may influence the link between learned helplessness and mental health.

Methods: A sample of 869 Chinese college students (443 male and 426 female), with a mean age of 20.03 (SD = 1.68), completed the Learned Helplessness Scale (LHS), Self-Compassion Scale (SCS), and DASS-21. The moderating effect of self-compassion on the relationship between learned helplessness and anxiety, depression, and stress were calculated.

Results: The interaction term between learned helplessness and self-compassion has a significant coefficient on anxiety, depression, and stress, pointing out self-compassion as a moderator of the association between learned helplessness and adverse mental health.

Limitations: In the absence of longitudinal data or experimental manipulations, cross-sectional methods cannot verify causal conclusions among the study variables. The analysing results are based only on self-reported data.

Discussion: The present study contributes to a deeper understanding of how learned helplessness and self-compassion during COVID-19 contribute to adverse mental health. The findings suggest that adverse mental health during lockdown is significantly associated with learned helplessness and that self-compassion can buffer this effect, contributing to future psychotherapy and clinical research. Future studies should examine the relationship through a longitudinal design to sort out whether self-compassion is a protective factor against learned helplessness or a moderator of the effects of learned helplessness on mental health.

1. Introduction

1.1. Learned helplessness and adverse mental health during COVID-19 lockdown

A newly identified coronavirus causes coronavirus disease (COVID-19), which began in late 2019. In addition to the threat posed by COVID-19 to social and economic development and people's lives and properties, the impact on mental health should not be ignored. A study investigated the mental health status of 1210 participants in different Chinese cities at the beginning of the epidemic (Wang et al., 2020). 53.8 % of respondents reported moderate or severe psychological problems, depressive symptoms-16.9 %, anxiety symptoms-28.8 %, and stress-8.1 %.

Maintaining social distance, closed university administration, and

family isolation are common measures to curb the spread of the virus that can effectively slow the spread of COVID-19 (Lau et al., 2020). China was the earliest country to adopt these measures and has achieved promising results in effectively curbing the spread of the epidemic (Kraemer et al., 2020). Nevertheless, the resulting changes in behavioural patterns and emotional functioning have had a non-negligible impact on mental health (Browning et al., 2021). Studies have pointed out that the deterioration of mental health during the COVID-19 epidemic was not only rooted in fear of contracting the disease but was also associated with measures to curb the virus, such as social isolation (Murphy et al., 2022; Xiao et al., 2020). Early adulthood is considered a risk group for COVID-19 at the psychological level (Huang and Zhao, 2020). College students during lockdown are faced with the routine of online learning, changes in assessment and examination approaches (Lee, 2020; Sahu, 2020), and uncertainty about academic and

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<https://doi.org/10.1016/j.jad.2023.01.099>

Received 25 May 2022; Received in revised form 10 January 2023; Accepted 27 January 2023

Available online 8 February 2023

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career prospects (Huang and Zhao, 2020), leading to higher levels of anxiety and depressive symptoms (Charbonnier et al., 2022), and even symptoms that have remitted after treatment are worsened by re-lockdown or extended (Parker et al., 2022). The college period is a critical transition period from late adolescence to adulthood, so it is necessary to focus on the mental health of college students during the COVID-19 epidemic.

An online intervention featuring eight modules on the following themes: emotion and stress regulation strategies, cognitive reassessment, and managing worry and uncertainty, etc., conducted during the COVID-19 lockdown, showed that the increase in mental health among college students was associated with a decrease in learned helplessness, while such change was not observed among subjects not participating in the project (Charbonnier et al., 2022), suggesting that learned helplessness may have been one of the potential causes of the deterioration of mental health among college students in the period (López Steinmetz et al., 2021).

The learned helplessness theory stems from the fact that individuals repeatedly experience frustrations but cannot change the situation; in other words, learned helplessness is “the internalisation of stable causes after failure” (Abramson et al., 1978). Individuals will lower their expectations of change when they learn that the behaviour will not lead to the desired outcome, resulting in a loss of motivation to respond to adverse situations proactively. After multiple failed attempts to influence a situation, individuals learn “response-outcome independence,” which is the basis for developing learned helplessness (Seligman, 1975). Studies from the early period of the COVID-19 pandemic have shown that frequent shelving or alteration of plans due to uncertainty and instability in the development of the epidemic may cause intense feelings of helplessness (Beato et al., 2021), such as daily plans or itineraries that are repeatedly forced to be modified during the pandemic, causing individuals to lose motivation and expectations to develop and implement positive plans. In addition, a lack of a sense of control over environmental events may also lead to learned helplessness (Fassett-Carman et al., 2018; Overmier and Seligman, 1967); specifically, the uncontrollability of the aversive event, rather than the aversive event itself, leads to learned helplessness (Wanke and Schwabe, 2020). Previous studies have clearly shown that the effects of controlled or uncontrolled stress are different, and that lack of control of even mildly aversive stimuli can lead to mood changes (e.g., tension, stress, unhappiness, anxiety, and depression) and changes in the neuroendocrine and autonomic nervous systems in healthy subjects (Breier et al., 1987). Perhaps because control perception leads individuals to believe that future threats can be minimized (Miller, 1979). A qualitative analysis showed that participants tended to attribute feelings of helplessness to a loss of control over their lives, such as the instability of lockdown measures and uncertainty about the duration of the measures (Williams et al., 2021).

In short, lockdown can contribute to feelings of helplessness and mental health problems. First, the objective fact of being governed by the epidemic and the immutability of the lockdown measures bring psychological stress. Second, the instability and uncontrollability of the epidemic and the duration of the lockdown make college students lose the expectation and effort to make changes inducing depression. In addition, the possibility of contracting the disease will bring anxiety and anxiety (Spitzer, 2021).

1.2. Self-compassion as the moderator

It is important to note that the extent to which feelings of uncontrollability interfere with mental health may vary across individuals (Ali et al., 2021), and these individual difference variables can be partially independent of individual experience and determine how an individual's mental health is affected by uncontrollable stressors (Bolger and Zuckerman, 1995). Previous research has shown that factors such as social support and coping styles can play a powerful buffering role (e.g., Liu et al., 2021; Roubinov et al., 2015). Since feelings of uncontrollability

are one of the main causes of mental health impacts during COVID-19 (Sigurvinsdottir et al., 2020), psychological traits that help cope with feelings of uncontrollability may buffer the negative effects of COVID-19 lockdown on college student's mental health. Based on these studies, we propose that self-compassion may be a character factor that exerts this buffering function in the context of uncontrollable stressful experiences to promote the mental health of college students.

Self-compassion includes the following components (1) treating suffering compassionately rather than critically self-judging, (2) viewing their own experiences as part of broader common humanity rather than avoiding or isolating, and (3) considering painful thoughts and feelings with positive awareness to reduce feelings of over-identification and being overwhelmed by negative emotions (Neff, 2003a). Both pre and during-epidemic studies showed that self-compassion enhances adaptability to mental health problems (Muris and Petrocchi, 2017; Matos et al., 2022), specifically, self-compassion attenuates or “buffers” the associations between negative psychological structures and mental (e.g., Körner et al., 2015), physical (e.g., Herriot et al., 2018), and burnout (e.g., Dev et al., 2020). Studies have shown that individuals with higher levels of self-compassion experience a lower risk of depression, anxiety, and stress symptoms during COVID-19 lockdown (Beato et al., 2021) and that self-compassion is unaffected by those measures and remains stable during prolonged periods of lockdown (Pauksik et al., 2022), suggesting that self-compassion may be a potential protective factor.

High levels of self-compassion cause college students to view the lockdown in a nonjudgmental way, while those lacking self-compassion tend to be more cognitively and behaviourally inclined to avoidance, which in turn exacerbates mental health problems (Krieger et al., 2013), and high anxiety and depressive symptoms reported during the COVID-19 lockdown were associated with the use of avoidance strategies (Le Vigouroux et al., 2021). At the same time, avoidance is also a characteristic of learned helplessness, suggesting that lower levels of self-compassion may be associated with learned helplessness and mental health among college students under the lockdown. Furthermore, individuals with high self-compassion can use appropriate strategies to cope with the consequence of highly uncontrollable events (Beato et al., 2021), such as accepting negative emotions rather than falling into depression. Gilbert (Gilbert, 2014) hypothesised that self-compassion activates parasympathetic activity, down-regulates sympathetic activity, reduces negative psychological states, and decreases autonomic stress responses (Khoury, 2020), which can, to some extent, buffer the automated sense of hopelessness that comes with learned helplessness in turn to a more positive way of coping with distress. Theory suggests that self-compassionate individuals are more effective in managing stress (Alkema et al., 2008; Vigna et al., 2018), for example, through more positive cognitive restructuring and less avoidance and escape (Allen and Leary, 2010), and are prone to disengage from unfruitful goal pursuit and redirect their energy to other goals, and in the face of perceived inadequacies more self-acceptance and kindness (Neely et al., 2009), and more tendency to use balanced, adaptive, and flexible coping strategies (Kyeong, 2013; Sirois et al., 2015).

Finally, the common humanity component of self-compassion can also reduce the isolation that comes with lockdown by treating the current state of affairs as a universal situation rather than a personal misfortune (Gutiérrez-Hernández et al., 2021), which helps buffer mental health problems caused by learned helplessness.

1.3. The present study

Although previous studies have demonstrated that adverse mental health of college students under COVID-19 is significantly associated with lockdown, no studies investigated the relationship between adverse mental health during COVID-19 lockdown and learned helplessness among Chinese college students. The moderating mechanism of self-compassion between learned helplessness and mental health of college students under the COVID-19 lockdown has also not been discussed.

Based on previous research and theory, we constructed a moderating model (shown in Fig. 1) to test the four hypotheses of this study:

Hypothesis 1. The adverse mental health of college students under COVID-19 lockdown is associated with learned helplessness.

Hypothesis 2. Self-compassion would buffer the relationship between learned helplessness and anxiety during COVID-19 lockdown.

Hypothesis 3. Self-compassion would buffer the relationship between learned helplessness and depression during COVID-19 lockdown.

Hypothesis 4. Self-compassion would buffer the relationship between learned helplessness and stress during COVID-19 lockdown.

2. Method

2.1. Procedure

We distributed online questionnaires to participants through Questionnaire Star Survey (an online questionnaire platform, <https://www.wjx.cn/>) via social media platforms such as WeChat and QQ. Participants were eligible to participate in this study if they were enrolled in a college that was in segregated status. The research ethics committee of the first author's institution approved the study. Informed consent was obtained from recruited participants before data collection. Participants were informed of the anonymity and confidentiality of the survey, and they could stop participating at any time before completing the study independently. We collected no missing data, as only complete responses to the questionnaire could be recorded. After excluding the sample that did not qualify (e.g., completed all 75 items in <120 s, 80 % of the responses were the same option or one or more wrong answers of 3 polygraph entries), 869 valid questionnaires were finally recovered from 1000 initial questionnaires, with a recovery rate of 86.9 %.

2.2. Ethics statement and participants

The research was approved by the local Ethics Committee. Participants were distributed across China, and in the final sample (age range 16–24 years, Mage = 20.03, SDage = 1.68, 49.02 % were female), 255 (29.3 %) respondents reported being an only child. In addition, 224 (25.8 %) respondents reported their family location, i.e., their pre-school residence was in urban areas compared to rural areas.

2.3. Measures

2.3.1. Self-compassion

Self-compassion was measured using the Self-Compassion Scale (SCS, Neff, 2003b), and good reliability and validity in the Chinese

version (Jian et al., 2011). This scale consists of 26 items and contains 6 dimensions: self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification. Participants rated each item on a 5-point scale ranging from 1 (very non-conforming) to 5 (very conforming). Higher scores indicate higher levels of self-compassion. For the current sample, Cronbach's alpha coefficient was good ($\alpha = 0.838$).

2.3.2. Learned helplessness

Learned helplessness was measured using the Chinese version of the Learned Helplessness Scale (LHS, Xiaoyan et al., 2009). It has been used in the sample of Chinese university students and shows good reliability and validity. The scale consists of 18 items and contains 2 dimensions: helplessness (e.g., “I feel helpless and hopeless at the moment”) and despair (e.g., “I want to cry”). Participants rated each item on a 5-point scale ranging from 1 (not at all) to 5 (ideally). Higher scores indicate higher levels of learned helplessness. For the current sample, Cronbach's alpha coefficient was good ($\alpha = 0.925$).

2.3.3. Mental health

Mental health was measured indirectly through the Depression Anxiety Stress Scales (DASS-21, Lovibond and Lovibond, 1995), which has been validated for reliability in a population of Chinese university students (Shan et al., 2020). The scale consists of 21 items measuring three negative emotional experiences of depression, anxiety, and stress. Participants rated each item on a 4-point scale ranging from 0 (not at all) to 3 (fully). The raw score was multiplied by 2 to obtain the final score, with a depression score > 9 indicating depression, anxiety score > 8 indicating anxiety, and a stress score > 15. The Cronbach's alpha coefficients for the total scale as well as the three factors in this study were good, ($\alpha_{\text{total}} = 0.951$, $\alpha_{\text{depression}} = 0.879$, $\alpha_{\text{anxiety}} = 0.855$, $\alpha_{\text{stress}} = 0.879$).

2.4. Data analysis

Data analysis followed the following steps. First, levels of learned helplessness, self-compassion, anxiety, depression, and stress and correlations among variables were explored by descriptive statistics and Pearson correlations using SPSS (version 24.0). Then, used MPLUS (Version 8.3) to examine the moderating role of self-compassion between learned helplessness and anxiety, depression, and stress using Latent Moderated Structural Equation (LMS). Finally, to visualise the interaction pattern, we plotted the simple slope of learned helplessness under low and high levels ($M \pm 1$ SD) of self-compassion on the predictive values of anxiety, depression, and stress, respectively (Fig. 2). In all analyses, we considered gender, age, being an only child, and family location as covariates.

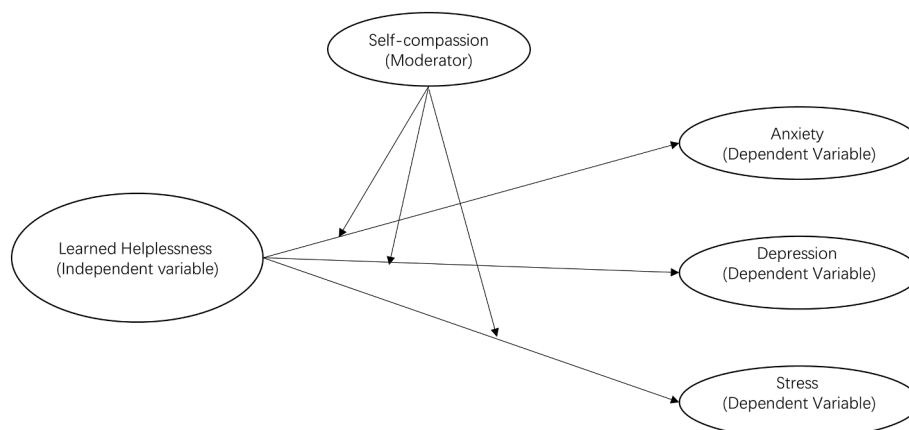


Fig. 1. The proposed moderated model.

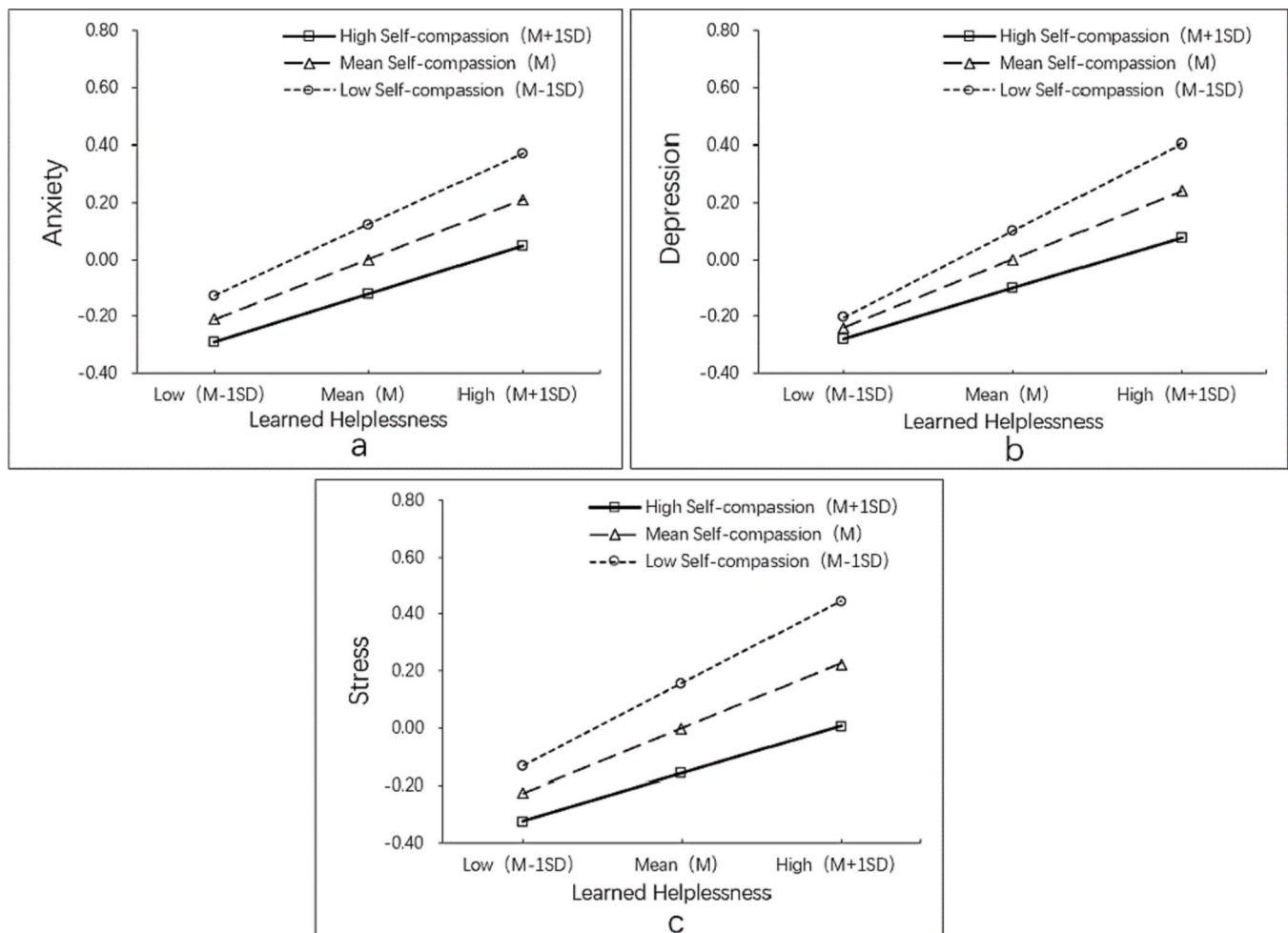


Fig. 2. Interaction effect of learned helplessness and self-compassion on anxiety (a), depression (b), and stress (c). Effects were unstandardized ($n = 869$).

3. Results

3.1. Preliminary analysis

Table 1 shows the means, standard deviations, and correlations between the main variables in the study. Significant correlations were found between all major variables. Specifically, learned helplessness was positively related to anxiety ($r = 0.57, p < 0.01$), depression ($r = 0.63, p < 0.01$), and stress ($r = 0.60, p < 0.01$), while negatively related to self-compassion ($r = -0.54, p < 0.01$). In addition, self-compassion was related to anxiety ($r = -0.45, p < 0.01$), depression ($r = -0.46, p < 0.01$), and stress ($r = -0.48, p < 0.01$). Finally, a high positive correlation between anxiety, depression, and stress r ranging from 0.83 to 0.85. Participants reported medium learned helplessness [mean (SDs) of 41.90 (11.87)]. Mean Self-compassion was 82.99 (SD = 9.46). The

percentages of depression score >9 , anxiety score >8 , and stress score >15 were 22.9 %, 35.1 %, and 12.9 %, meaning that more than one-fourth of the sample had mental health problems. In addition, independent sample t -test results indicated that males reported lower levels of learned helplessness, depression, anxiety, and stress compared to females ($p < 0.05$), but there was no gender difference in self-compassion ($p > 0.05$).

3.2. Testing for the moderation model

MPLUS (Version 8.3) was used to construct a moderating model to test the moderating effect of self-compassion between learned helplessness and depression, anxiety, and stress. Due to the LMS method does not provide a fit index for the latent moderation model, the model fit was determined by comparing the AIC or log-likelihood ratio test of the

Table 1
Intercorrelations among the key variables ($n = 869$).

	M \pm SD	1	2	3	4	5	6
1. Age	20.03 \pm 1.68	1					
2. Learned Helplessness	41.90 \pm 11.87	0.11**	1				
3. Self-compassion	82.99 \pm 9.46	-0.01	-0.54**	1			
4. Depression	3.21 \pm 3.57	0.24**	0.63**	-0.46**	1		
5. Anxiety	3.78 \pm 3.61	0.22**	0.57**	-0.45**	0.83**	1	
6. Stress	4.42 \pm 3.91	0.23**	0.60**	-0.48**	0.84**	0.85**	1

Note. SD = standard deviation.

** $p < 0.01$.

model containing the interaction term (moderation model) and the base model, as suggested by Jackman et al. (2011). As shown in Table 2, the base model fits good. In addition, the moderation model has a 32.203 decrease in AIC compared to the base model; the moderation model has an increase in Log Likelihood value of 23.308, $-2LL = 40.613$, and an increase in degrees of freedom of 3, compared to the base model. The significance test of $\chi^2(40.614, 3)$ showed $p < 0.001$, indicating that the moderation model has a good fit.

The moderated effects results were shown in Table 3, where the total model explained 47 % of the variance in anxiety symptoms, 54 % of the variance in depressive symptoms, and 51 % of the variance in stress symptoms after controlling for gender, age, family location, and whether being an only child. Results suggested that learned helplessness was significantly and positively associated with anxiety for both college students with high and low self-compassion ($b_{\text{high}} = 0.182, p < 0.001$; $b_{\text{low}} = 0.481, p < 0.001$), but those students with low levels of self-compassion showed high anxiety (see Fig. 2a). Notably, those students with lower levels of self-compassion were more likely to be influenced by learned helplessness than those with high levels of self-compassion. Similarly, high levels of learned helplessness were significantly associated with depression for college students with both low and high levels of self-compassion ($b_{\text{high}} = 0.147, p < 0.001$; $b_{\text{low}} = 0.610, p < 0.001$), but the levels of depression were lower for those students with high self-compassion (see Fig. 2b). A similar moderating effect of self-compassion was found for stress ($b_{\text{high}} = 0.141, p < 0.001$; $b_{\text{low}} = 0.575, p < 0.001$), the levels of stress were lower for those students with high self-compassion, but the low self-compassion led to higher stress (see Fig. 2c).

4. Discussion

Although many studies have shown that quarantine during COVID-19 leads to mental health deterioration among college students, few studies have focused on the relationship between mental health problems and learned helplessness in a closed context. This study aimed to examine the relationship between anxiety, depression, stress, and learned helplessness among college students due to the lockdown of universities during the COVID-19 epidemic and the moderating role of self-compassion between learned helplessness and anxiety, depression, and stress. In a sample of 869 college students, the detection rates of 22.9 % for depression, 35.1 % for anxiety, and 12.9 % for stress were generally consistent with previous findings (Parker et al., 2022). All symptoms are significantly and positively associated with learned helplessness, and our study supports the moderating role of self-compassion in the relationship between learned helplessness and mental health. Specifically, as hypothesised, self-compassion acts as a buffer.

The buffering role of self-compassion on the learned helplessness - psychopathology link echoes the concept of self-compassion as a protective factor in Neff's (2003a) model. Under this model, self-compassion mitigates the fear of viruses and the adverse effects of lockdown, allows students to be kinder to themselves, assess the negative impact of lockdown as a shared experience with others, and focus on

their own needs, helping to mitigate the adverse effects resulting from learned helplessness. Although our results are based on cross-sectional data and the exact mechanisms remain unclear, higher self-compassion predicted better outcomes across all three outcomes, suggesting that it may be a potential target for interventions with university students during the COVID-19 lockdown.

First, the sense of uncontrollability can lead to learned helplessness and consequently depression symptoms due to the instability of the epidemic and quarantine policy changes, the frequent interruption of schedules of outings or studies, and the inability to change the status of the lockdown by complying with those measures (i.e., learning to react-result separately and independently of each other). In contrast, college students with high self-compassion were more likely to adopt positive emotional coping strategies in the face of uncontrollable events, such as accepting the fact of the lockdown and acknowledging its necessity for epidemic prevention and control, which could reduce the adverse effects of feelings of uncontrollability and reduce depressive symptoms. On the other hand, low self-compassion college students tend to isolate their suffering from the fact that many people are experiencing similar grief, such as perceiving the quarantine as a punishment for going out.

Meanwhile, reduced opportunities to go out and alienation from friends resulting in college students' inability to engage in other activities that typically manage their emotions (such as hanging out with friends or participating in sports) will further exacerbate loneliness and anxiety (Gutiérrez-Hernández et al., 2021). Students with high self-compassion tend to view their current situation as a common one and respond to present difficulties with a more objective attitude, which helps reduce feelings of anxiety and isolation.

In addition, the conflict between the reality that low self-compassion college students are powerless to block the status quo and the urgency to change it may lead to negative emotions such as low self-esteem and feelings of worthlessness and reduce the motivation to defend against the stressor, leading to stress (Fassett-Carman et al., 2018). In contrast, students with high self-compassion tend to be less critical of themselves and treat themselves in a more friendly manner, recognising that the source of conflict is the persistence and instability of the epidemic rather than their lack of competence, thus maintaining motivation to cope with potential stressors. Students also face multiple academic challenges during the lockdown (e.g., transition to online learning, changes in assessment and examination format), which will exacerbate students' psychological stress. Self-compassion enables college students to respond to change with a positive attitude, such as peace of mind, rather than exaggerating its effect, which will help stabilise emotions and reduce stress.

In conclusion, highly self-compassion college students were more likely to use positive reinterpretation as a coping strategy, to be able to adapt to the positive aspects of the lockdown, and to maintain a positive psychological state, regardless of the level of learned helplessness.

Our findings have the following practical implications. First, this study extended the application of Abramson's et al. (1978) learned helplessness model and extended it to the college students under the COVID-19 lockdown. Second, from the standpoint of Neff's self-compassion theory (Neff, 2003a), we improved the shortcomings of Seligman's model in the application of mental health associated with the epidemic and enriched the development of their models. Third, the current study suggests that learned helplessness is a risk factor for mental health problems during the COVID-19 lockdown among Chinese university students and that self-compassion is a significant "buffering" factor. Therefore, it is important to reduce learned helplessness or its influences on students' mental health in lockdown areas. Regular but brief self-compassion training via app-based programs or online programs is a feasible approach to improve self-compassion and reduce psychological symptoms in lockdown (Parker et al., 2022). College students suffering from mental health problems are more receptive to app-based programs or online programs relative to face-to-face interventions (Rayn et al., 2010), but the issue of dropout rates for online

Table 2
Model comparison of the base model and moderation model.

	Base model	Moderation model	Result
AIC	11,841.702	11,809.499	32.203
Loglikelihood	-5853.851	-5833.749	$p < 0.001$
Free parameters	68	71	
BIC	12,161.114	–	
χ^2/df	3.302	–	
RMSEA	0.051	–	
CFI	0.973	–	
TLI	0.965	–	
SRMR	0.032	–	

Table 3

Results of moderation models.

	Anxiety		Depression		Stress	
	B	SE	B	SE	B	SE
Gender	0.005	0.028	0.036	0.025	0.049	0.029
Age	0.038***	0.008	0.041***	0.008	0.046***	0.009
The only child	0.094**	0.032	0.068*	0.029	0.088*	0.034
Family Location	0.063	0.032	0.038	0.029	0.057	0.034
Learned Helplessness	0.331***	0.032	0.379***	0.029	0.358***	0.034
Self-compassion	−0.287***	0.043	−0.235***	0.04	−0.371***	0.045
Learned Helplessness × Self-compassion	−0.150***	0.041	−0.232***	0.036	−0.217***	0.042
R ²	0.469		0.539		0.510	

Note. B = unstandardized coefficient. SE = standard error.

* $p < 0.05$.** $p < 0.01$.*** $p < 0.001$.

programs cannot be ignored, with several recent online programs provided for college students with anxiety and depression showing dropout rates ranging from 24 to 60 % (Karyotaki et al., 2022; Newman et al., 2021). The government and education departments can provide more mental health services for college students and establish a complete online health education system. Fourth, our findings suggest that mitigating risk factors are equally important, such as learned helplessness. The uncontrollability of the lockdown measures and the epidemic's instability is the primary sources of learned helplessness during the COVID-19 (Williams et al., 2021). The government and university administration should accurately release information about the epidemic and the lockdown promptly to ensure information transparency to reduce the worry and anxiety of college students.

5. Limitations and future direction

This study also has the following limitations. First, in the absence of longitudinal data or experimental manipulations, cross-sectional methods cannot verify causal conclusions among the study variables. Nonetheless, cross-sectional analysis can still predict causality to some extent (Shrout, 2011). Future research could further sort out whether self-compassion is a protective factor against learned helplessness or a moderator of the effects of learned helplessness on mental health, in addition to verifying causality through a longitudinal design. Second, common method bias is the possible impact of analysing results based only on self-reported data. Harman's single-factor test was used to verify the severity of potential bias (Podsakoff et al., 2003). The results showed that 11 factors with a characteristic root >1 were extracted, and the variance explained by the first factor was 27.21 %, which is much less than the 40 % critical value. Future studies could collect multilevel data or use multiple approaches to collect data. Third, all samples in this study were Chinese college students, which is culturally homogeneous. Future research should be conducted in different cultural contexts. Fourth, we ignored potential confounding factors. Future research could consider potential confounders, such as psychological resilience.

6. Conclusion

In conclusion, this study aimed to explore the relationship between mental health and learned helplessness among college students under the COVID-19 lockdown and the potential buffer mechanisms of self-compassion. The findings indicated that Chinese college students' mental health was negatively related to learned helplessness. Additionally, self-compassion moderates all direct relationships (learned helplessness → anxiety, learned helplessness → depression, learned helplessness → stress). These findings provide a theoretical model or insight to understand how learned helplessness during the COVID-19 lockdown will influence the mental health of college students and the buffering role of self-compassion. Considering the persistence of the

COVID-19 epidemic, future research could develop self-compassion interventions for college students during lockdown to mitigate mental health problems based on this moderating model.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Jinghua Jiang directed the protocol design and suggested revisions to the manuscript. Shengping Xue undertook the statistical analysis and wrote the first draft of the manuscript. Qian Gu was responsible for the literature search and analysis. Kaixu Zhu completed the revised manuscript and responded to all review comments.

Conflict of interest

None.

Acknowledgements

Thanks to all the participants who provided support for this study.

References

- Abramson, L.Y., Seligman, M.E., Teasdale, J.D., 1978. Learned helplessness in humans: critique and reformulation. *Journal of Abnormal Psychology* (1965) 87 (1), 49–74. <https://doi.org/10.1037/0021-843X.87.1.49>.
- Ali, A., Abbas, S., Khan, A.A., Khan, A.S., Abbas, H.S.M., 2021. Difference in stress-related indicators between employees experiencing partial and complete lockdowns during the COVID-19 pandemic in Pakistan. *J. Emerg. Manag.* 19 (7), 177–192. <https://doi.org/10.5055/jem.0621>.
- Alkema, K., Linton, J.M., Davies, R., 2008. A study of the relationship between self-care, compassion satisfaction, compassion fatigue, and burnout among hospice professionals. *J. Soc. Work End Life Palliat. Care* 42 (2), 101–119. <https://doi.org/10.1080/15524250802353934>.
- Allen, A.B., Leary, M.R., 2010. Self-compassion, stress, and coping. *Soc. Personal. Psychol. Compass* 4 (2), 107–118. <https://doi.org/10.1111/j.1751-9004.2009.00246.x>.
- Beato, A.F., Da Costa, L.P., Nogueira, R., 2021. “Everything is gonna be alright with me”: the role of self-compassion, affect, and coping in negative emotional symptoms during coronavirus quarantine. *Int. J. Environ. Res. Public Health* 18 (4), 2017. <https://doi.org/10.3390/ijerph18042017>.
- Bolger, N., Zuckerman, A., 1995. A framework for studying personality in the stress process. *J. Pers. Soc. Psychol.* 69 (5), 890–902. <https://doi.org/10.1037/0022-3514.69.5.890>.
- Breier, A., Albus, M., Pickar, D., Zahn, T.P., Wolkowitz, O.M., Paul, S.M., 1987. Controllable and uncontrollable stress in humans: alterations in mood and neuroendocrine and psychophysiological function. *Am. J. Psychiatry* 144 (11), 1419–1425. <https://doi.org/10.1176/ajp.144.11.1419>.
- Browning, M.H.E.M., Larson, L.R., Sharaievska, I., Rigolon, A., Mcanirlin, O., Mullenbach, L., Alvarez, H.O., 2021. Psychological impacts from COVID-19 among university students: risk factors across seven states in the United States. *PLOS ONE* 16 (1), e0245327. <https://doi.org/10.1371/journal.pone.0245327>.

- Charbonnier, E., Trémoilère, B., Baussard, L., Goncalves, A., Lespiau, F., Philippe, A.G., Le Vigouroux, S., 2022. Effects of an online self-help intervention on university students' mental health during COVID-19: a non-randomized controlled pilot study. *Comput. Hum. Behav. Rep.* 5, 100175 <https://doi.org/10.1016/j.chbr.2022.100175>.
- Dev, V., Iii, A.T.F., Considine, N.S., 2020. Self-compassion as a stress moderator: a cross-sectional study of 1700 doctors, nurses, and medical students. *Mindfulness* 11 (5), 1170–1181. <https://doi.org/10.1007/s12671-020-01325-6>.
- Fassett-Carman, A., Hankin, B.L., Snyder, H.R., 2018. Appraisals of dependent stressor controllability and severity are associated with depression and anxiety symptoms in youth. *Anxiety Stress Coping* 32 (1), 32–49. <https://doi.org/10.1080/10615806.2018.1532504>.
- Gilbert, P., 2014. The origins and nature of compassion focused therapy. *Br. J. Clin. Psychol.* 53 (1), 6–41. <https://doi.org/10.1111/bjc.12043>.
- Gutiérrez-Hernández, M.E., Fanjul, L.F., Díaz-Megolla, A., Reyes-Hurtado, P., Herrera-Rodríguez, J.F., Enjuto-Castellanos, M.D.P., Peñate, W., 2021. COVID-19 lockdown and mental health in a sample population in Spain: the role of self-compassion. *International Journal of Environmental Research and Public Health* 18 (4), 2103. <https://doi.org/10.3390/ijerph18042103>.
- Herriot, H., Wrosch, C., Gouin, J., 2018. Self-compassion, chronic age-related stressors, and diurnal cortisol secretion in older adulthood. *J. Behav. Med.* 41 (6), 850–862. <https://doi.org/10.1007/s10865-018-9943-6>.
- Huang, Y., Zhao, N., 2020. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res.* 288, 112954 <https://doi.org/10.1016/j.psychres.2020.112954>.
- Jackman, M.G., Leite, W.L., Cochran, D.J., 2011. Estimating latent variable interactions with the unconstrained approach: a comparison of methods to form product indicators for large, unequal numbers of items. *Struct. Equ. Model.* 18 (2), 274–288. <https://doi.org/10.1080/10705511.2011.557342>.
- Jian, C., Liangshi, Y., Lihua, Z., 2011. Reliability and validity of Chinese version of self-compassion scale. *Chin. J. Clin. Psych.* 19 (6), 734–736. <https://doi.org/10.16128/j.cnki.1005-3611.2011.06.006>.
- Karyotaki, E., Klein, A.M., Ciharova, M., Bolinski, F., Krijnen, L., de Koning, L., Cuijpers, P., 2022. Guided internet-based transdiagnostic individually tailored Cognitive Behavioral Therapy for symptoms of depression and/or anxiety in college students: a randomized controlled trial. *Behav. Res. Ther.* 150, 104028 <https://doi.org/10.1016/j.brat.2021.104028>.
- Khoury, B., 2020. The root causes of COVID-19 screech for compassion. *Mindfulness* 11 (8), 1910–1913. <https://doi.org/10.1007/s12671-020-01412-8>.
- Körner, A., Coroiu, A., Copeland, L., Gomez-Garibello, C., Albani, C., Zenger, M., Brähler, E., 2015. The role of self-compassion in buffering symptoms of depression in the general population. *PLoS one* 10 (10), e0136598. <https://doi.org/10.1371/journal.pone.0136598>.
- Kraemer, M.U.G., Yang, C., Gutierrez, B., Wu, C., Klein, B., Pigott, D.M., 2020. The Effect of Human Mobility and Control Measures on the COVID-19 Epidemic in China. *medRxiv: The Preprint Server for Health Sciences*, 3(2). <https://doi.org/10.1101/2020.03.02.20026708>, 20026708.
- Krieger, T., Altenstein, D., Baettig, I., Doerig, N., Holtforth, M.G., 2013. Self-compassion in depression: associations with depressive symptoms, rumination, and avoidance in depressed outpatients. *Behav. Ther.* 44 (3), 501–513. <https://doi.org/10.1016/j.beth.2013.04.004>.
- Kyeong, L.W., 2013. Self-compassion as a moderator of the relationship between academic burn-out and psychological health in Korean cyber university students. *Personal. Individ. Differ.* 54 (8), 899–902. <https://doi.org/10.1016/j.paid.2013.01.001>.
- Lau, H., Khosrawipour, V., Kocbach, P., Mikolajczyk, A., Schubert, J., Bania, J., Khosrawipour, T., 2020. The positive impact of lockdown in Wuhan on containing the COVID-19 outbreak in China. *J. Travel Med.* 27 (3), taaa037 <https://doi.org/10.1093/jtm/taaa037>.
- Le Vigouroux, S., Goncalves, A., Charbonnier, E., 2021. The psychological vulnerability of french university students to the COVID-19 confinement. *Health Educ. Behav.* 48 (2), 123–131. <https://doi.org/10.1177/1090198120987128>.
- Lee, J., 2020. Mental health effects of school closures during COVID-19. *Child Adolesc. Health* 4 (6), 421. [https://doi.org/10.1016/S2352-4642\(20\)30109-7](https://doi.org/10.1016/S2352-4642(20)30109-7).
- Liu, C., Huang, N., Fu, M., Zhang, H., Feng, X., Guo, J., 2021. Relationship between risk perception, social support, and mental health among general Chinese population during the COVID-19 pandemic. *Risk Manag. Healthc. Policy* 14, 1843–1853. <https://doi.org/10.2147/RMHP.S302521>.
- López Steinmetz, L.C., Leyes, C.A., Dutto Florio, M.A., Fong, S.B., López Steinmetz, R.L., Godoy, J.C., 2021. Mental health impacts in Argentinean college students during COVID-19 quarantine. *Front Psychiatry* 12, 557880. <https://doi.org/10.3389/fpsy.2021.557880>.
- Lovibond, P.F., Lovibond, S.H., 1995. The structure of negative emotional state: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behav. Res. Ther.* 33 (3), 335–343. [https://doi.org/10.1016/0005-7967\(94\)00075-u](https://doi.org/10.1016/0005-7967(94)00075-u).
- Matos, M., Mcewan, K., Kanovský, M., Halamová, J., Steindl, S.R., Ferreira, N., Gilbert, P., 2022. Compassion protects mental health and social safeness during the COVID-19 pandemic across 21 countries. *Mindfulness* 13 (4), 863–880. <https://doi.org/10.1007/s12671-021-01822-2>.
- Miller, S.M., 1979. Controllability and human stress: method, evidence and theory. *Behav. Res. Ther.* 17 (4), 287–304. [https://doi.org/10.1016/0005-7967\(79\)90001-9](https://doi.org/10.1016/0005-7967(79)90001-9).
- Muris, P., Petocchi, N., 2017. Protection or vulnerability? A meta-analysis of the relations between the positive and negative components of self-compassion and psychopathology. *Clin. Psychol. Psychother.* 24 (2), 373–383. <https://doi.org/10.1002/cpp.2005>.
- Murphy, D., Williamson, C., Baumann, J., Busuttill, W., Fear, N.T., 2022. Exploring the impact of COVID-19 and restrictions to daily living as a result of social distancing within veterans with pre-existing mental health difficulties. *BMJ Mil. Health* 168 (1), 29–33. <https://doi.org/10.1136/bmj.military-2020-001622>.
- Neely, M.E., Schallert, D.L., Mohammed, S.S., Roberts, R.M., Chen, Y., 2009. Self-kindness when facing stress: the role of self-compassion, goal regulation, and support in college students' well-being. *Motiv. Emot.* 33 (1), 88–97. <https://doi.org/10.1007/s11031-008-9119-8>.
- Neff, K.D., 2003a. Self-compassion: an alternative conceptualization of a healthy attitude toward oneself. *Self Identity* 2 (2), 85–101. <https://doi.org/10.1080/15298860309032>.
- Neff, K.D., 2003. The development and validation of a scale to measure self-compassion. *Self Identity* 2 (3), 223–250. <https://doi.org/10.1080/15298860309027>.
- Newman, M.G., Kanuri, N., Rackoff, G.N., Jacobson, N.C., Bell, M.J., Taylor, C.B., 2021. A randomized controlled feasibility trial of internet-delivered guided self-help for generalized anxiety disorder (GAD) among university students in India. *Psychotherapy* 58 (4), 591–601. <https://doi.org/10.1037/pst0000383>.
- Overmier, J.B., Seligman, M.E., 1967. Effects of inescapable shock upon subsequent escape and avoidance responding. *J. Comp. Physiol. Psychol.* 63 (1), 28–33. <https://doi.org/10.1037/h0024166>.
- Parker, A., Dash, S., Bourke, M., Patten, R., Craike, M., Baldwin, P., Pascoe, M., 2022. A brief, daily, online mental health and well-being intervention for university staff during the COVID-19 pandemic: program description and outcomes using a mixed methods design. *JMIR Formative Res.* 6 (2), e35776 <https://doi.org/10.2196/35776>.
- Pauscik, M., Leys, C., Marais, G., Baeyens, C., Shankland, R., 2022. Self-compassion and savouring buffer the impact of the first year of the COVID-19 on PhD students' mental health. *Stress. Health* 38 (5), 891–901. <https://doi.org/10.1002/smi.3142>.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J., Podsakoff, N.P., 2003. Common method biases in behavioral research: a critical review of the literature and recommended remedies. *J. Appl. Psychol.* 88 (5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>.
- Rayn, M.L., Shochet, I.M., Stallman, H.M., 2010. Universal online interventions might engage psychologically distressed university students who are unlikely to seek formal help. *Adv. Ment. Health* 9 (1), 73–83. <https://doi.org/10.5172/jamh.9.1.73>.
- Roubinov, D.S., Turner, A.P., Williams, R.M., 2015. Coping among individuals with multiple sclerosis: evaluating a goodness-of-fit model. *Rehabil. Psychol.* 60 (2), 162–168. <https://doi.org/10.1037/rep0000032>.
- Sahu, P., 2020. Closure of universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. *Cureus* 12 (4), e7541. <https://doi.org/10.7759/cureus.7541>.
- Seligman, M.E.P., 1975. *Helplessness: On Depression, Development, and Death*. W H Freeman/ Times Books/ Henry Holt & Co.
- Shan, L., Xinyu, D., Mingyue, Q., 2020. Longitudinal measurement invariance of the Chinese versions of DASS-21 in college students. *Chin. J. Clin. Psych.* 28 (5), 950–953. <https://doi.org/10.16128/j.cnki.1005-3611.2020.05.019>.
- Shrout, P.E., 2011. Commentary: mediation analysis, causal processes, and cross-sectional data. *Multivar. Behav. Res.* 46 (5), 852–860. <https://doi.org/10.1080/00273171.2011.606718>.
- Sigurvinsdottir, R., Thorisdottir, I.E., Gylfason, H.F., 2020. The Impact of COVID-19 on mental health: the role of locus of control and internet use. *Int. J. Environ. Res. Public Health* 17 (19), 6985. <https://doi.org/10.3390/ijerph17196985>.
- Siroisab, F.M., Molnar, D.S., Hirsch, J.K., 2015. Self-compassion, stress, and coping in the context of chronic illness. *Self Identity* 14 (3), 334–347. <https://doi.org/10.1080/15298868.2014.966249>.
- Spitzer, M., 2021. Open schools! Weighing the effects of viruses and lockdowns on children. *Trends Neurosci. Educ.* 22, 100151 <https://doi.org/10.1016/j.tine.2021.100151>.
- Vigna, A.J., Poehlmann-Tynan, J., Koenig, B.W., 2018. Does self-compassion facilitate resilience to stigma? A school-based study of sexual and gender minority youth. *Mindfulness* 9 (3), 914–924. <https://doi.org/10.1007/s12671-017-0831-x>.
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C.S., Ho, R.C., 2020. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int. J. Environ. Res. Public Health* 17 (5), 1729. <https://doi.org/10.3390/ijerph17051729>.
- Wanke, N., Schwabe, L., 2020. Subjective uncontrollability over aversive events reduces working memory performance and related large-scale network interactions. *Cereb. Cortex* 30 (5), 3116–3129. <https://doi.org/10.1093/cercor/bhz298>.
- Williams, S.N., Armitage, C.J., Tampe, T., Dienes, K.A., 2021. Public perceptions of non-adherence to pandemic protection measures by self and others: a study of COVID-19 in the United Kingdom. *PLOS ONE* 16 (10), e0258781. <https://doi.org/10.1371/journal.pone.0258781>.
- Xiao, H., Zhang, Y., Kong, D., Li, S., Yang, N., 2020. Social capital and sleep quality in individuals who self-isolated for 14 days during the coronavirus disease 2019 (COVID-19) outbreak in January 2020 in China. *Med. Sci. Monit.* 26, e923921 <https://doi.org/10.12659/MSM.923921>.
- Xiaoyan, W., Hong, Z., Shaobin, M., Junwei, W., Xiaoning, X., 2009. Development of learned helplessness scale and its relationship with personality. *J. Sun Yat-sen Univ. (Zhong Shan Yi Ke Da Xue Xue Bao)* 30 (3), 357–361. [https://doi.org/10.13471/j.cnki.j.sun.yat-sen.univ\(med.sci\).2009.0078](https://doi.org/10.13471/j.cnki.j.sun.yat-sen.univ(med.sci).2009.0078).